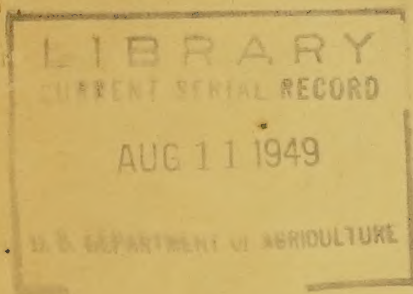


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SUGGESTED SUBJECT MATTER FOR CO-OP ELECTRIFICATION ADVISER TRAINING SCHOOLS



OUTLINE NO. 1

ORIENTATION IN

POWER USE



**EDUCATIONAL
TECHNIQUES**



COOPERATIVES

PURPOSE OF THIS OUTLINE

This outline is one in a series prepared by REA as a guide to electric co-ops in training electrification advisers who have been employed to help co-op members make better use of the facilities they have in their co-ops. Many co-ops have requested a subject matter outline that could be given to electrification advisers at the close of a training school. Each outline in the series covers one power use subject, one cooperative subject and one educational method or technique. It is recognized that the planning committees which are responsible for these training programs may desire different combinations of subject matter than those indicated. Nevertheless, the subject matter has been outlined rather completely here to make the outline of maximum value to the adviser.

OUTLINES IN THE SERIES

NO.	DATE	POWER USE SUBJECT	CO-OP SUBJECT	EDUCATIONAL TECHNIQUE
1	6-48	Orientation	Orientation	Orientation
2	12-48	Farm and Home Wiring	Value of Co-op Membership	The Co-op Newsletter
3	2-49	Farm Motors	Integrating Power Use and Co-op Education	Using the Radio
<i>(Outlines in Preparation) *</i>				
		Water Systems and Plumbing	The REA Program and Co-ops	Demonstration Techniques
		Electrical Cookery	Using Community Resources	Effective Talks
		Laundry Equipment	Assuring Member Participation	Effective Meetings
		Poultry Production	Working With Rural Youth	Photography and Motion Pictures
		Refrigeration	Building Community Relations	Working With Newspapers
		Small Appliances	How Co-ops Can Cooperate	Exhibits and Displays
		Dairying	A Good Annual Meeting	Co-op Publications

OTHER PROPOSED TOPICS: Pig brooding; farm lighting; farm shop; pump irrigation; garden watering; hotbeds; elevating, cleaning and grading grain; drying grain, hay, peanuts, etc.; heating, cooling, ventilating the home.

** Exact combination of topics not yet determined*

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration
Applications and Loans Division

SUBJECT MATTER FOR
PROPOSED
ORIENTATION PROGRAM
FOR
COOPERATIVE ELECTRIFICATION
ADVISERS

June 1, 1948

I. Basic Information on Cooperative Movement

- A. Status of rural electrification in the country at inception of REA. (1935)
- B. Status of rural electrification in the country now.
(Give date)
- C. Comparison of progress made in United States and other countries at the beginning of REA.
- D. REA, a lending agency, builds no lines, buys no equipment.
 1. Lends money, mostly to co-ops, for:
 - a. Line construction
 - b. Office and maintenance equipment
 - c. Headquarters buildings
 - d. Generating plants
 - e. Transmission lines
 2. For consumer purchasing:
 - a. Home and farm wiring
 - b. Water systems and plumbing
 - c. Electric home appliances
 - d. Electric farm equipment
- E. Cooperatives, a major factor in this development
 1. Number of borrowers, by types
 2. Consumers served
- F. The Cooperative:
 1. Define a cooperative as a business run for the benefit of the patrons and controlled by the patrons.
 2. List Rochdale principles as the type of organization selected as best for an electric co-op.
 3. Point out the nature of the co-op as a private, local, tax-paying business. Compare with corporations, partnerships and individual proprietorships.
 4. Outline typical internal organization of a co-op.

4. Continued

Co-op Membership

Attorney	Board of Directors	Board Committees
Engineer	Manager	Wiring Inspector
Office	Maintenance	Education
Bookkeeper	Line Foreman	Agricultural Engineer
Secretary	Linemen	Home Economist
Cashier	Groundman	Volunteers:
Clerks	Store's Clerk	Educational Committee
		Community and neighborhood leaders

G. Co-op Principles

1. Open membership (area coverage).
2. Democratic control (each member has 1 vote).
3. No profits to investors (only interest on REA loan.)
4. Service at cost (excess payments credited to patrons as capital).
5. Political, racial, and religious neutrality (avoid controversy).
6. Cash trading (credit business means losses).
7. Education in cooperation (no security without informed members).

H. A Successful REA Co-op

1. Serves everyone in the rural area.
2. Is ahead on its loan repayment.
3. Has high average KWH consumption.
4. Has few minimum users.
5. Has no delinquent accounts.
6. Enjoys wholehearted member support.
7. Has good annual meetings
8. Gets full community support.
9. Is an outstanding community enterprise.

I. Advantages of Co-op Service

1. Service to all (no unserved pockets).
2. Service at cost (excess receipts credited to patrons as capital).
3. Low cost service (through economies in financing, construction, non-profit operation).
4. Consumers pay for lines only once (paying back REA loan).
5. Consumers own system (equity increases as REA loan is repaid).
6. Full local control by co-op members (a real community enterprise).

J. How REA Co-op Success is Assured

1. Intelligent direction by a conscientious board.
2. Efficient operation through good management.
3. Member education in co-op functioning.
4. Member education in putting electricity to use.
5. Assistance to members in getting needed equipment.
6. Rates no higher than necessary.
7. Policy of full area coverage.
8. Cooperation with civic and educational groups.
9. Building good public relations.

K. Specific Desirable Activities

1. Interesting and informative newsletter.
2. Press and radio publicity.
3. Community and neighborhood meetings.
4. Planning annual meetings members will come to.
5. Displays and demonstrations of farm and home equipment.
6. Working with schools and youth groups.
7. Developing interest in new rural industries.
8. Promoting community improvements.
9. Taking REA co-op story to townspeople in area.

L. A Good REA Co-op Member

1. Learns about his co-op rights and responsibilities.
2. Comes to meetings and makes his vote count.
3. Reads meter and pays bills promptly.
4. Reports outages and line trouble promptly.
5. Gives full cooperation to co-op staff.
6. Reads newsletters, etc., carefully.
7. Learns to be safety-minded.
8. Puts electricity to maximum use on farm and in home.
9. Knows how to answer unfair attacks on co-op.
10. Works for service to all on an area basis.

II. Electrification Adviser's Responsibilities

- A. Aiding members to understand the immediate and long range benefits to be gained through membership in the co-op.
- B. Aiding members to understand cooperative principles and methods, their co-op and its problems, and their rights and responsibilities as set forth in the bylaws.
- C. Enlisting active member participation and interest in co-op affairs to assure the broad basis of member support and member control which is essential to the co-op's safety and permanence as a consumer-owned and controlled service enterprise.
- D. Aiding members to understand the importance of good, safe, and adequate wiring and lighting for home and farm, to plan for adequate wiring and lighting, and to obtain a good job at a reasonable cost.
- E. Aiding members to understand the benefits obtainable on the farm from a pressure water system, to plan for a modern plumbing installation adequate for family and farm needs, and to obtain a satisfactory installation at a reasonable cost.
- F. Aiding members to know what electric appliances and equipment will be most beneficial or profitable for them to use in their homes and in their farming operations, and helping them obtain the desired appliances and equipment.
- G. Aiding members to understand the problems involved in the operation and care of their electrical equipment, also problems relating to repair and servicing of their equipment, so as to get the greatest possible benefits from the use of electricity.
- H. Getting acquainted with the programs and personnel of other agencies and organizations that are locally concerned with the educational needs and welfare of rural people, and ask for and offer aid in carrying out such programs that relate to power use and cooperative education.
- I. Working with civic groups and community leaders in the co-op area in promoting and developing the effective application of electricity to various community facilities, such as schools and churches, health and community centers, service enterprises and new rural industries. This also includes offering assistance in the planning and carrying out of school lunch programs.

III. Methods of Getting Information to Farm Families

- A. Lecture Demonstrations for annual meetings and other large groups. Similar to ordinary speeches in that they are mainly useful in presenting material of general interest to the listening group. They are adapted to creating a general understanding of previously unknown techniques, and the coordination of previously known details. They are not well adapted to teaching broad concepts, and they are ineffective in teaching skills.

1. Demonstrations are dramatized education
 - a. Direct fact presentation
 - b. Proof through performance
 - c. Require demonstrator who has obtained technical knowledge, practical skill, and operating experience
 - d. Include basic personal appeals
 - (1) Arouse interest by showing desirable features
 - (a) Labor saving
 - (b) Cost reduction
 - (c) Improved product
 - (d) Increased production
 - (e) Tie in common experience with new method.
 - (f) Better living standards
 - (2) Factual rather than high pressure
 - (3) Delayed selling is effective rural approach
 - (a) No dotted line pressure
 - (b) Permits individual to plan and organize farm electrification program.
2. Demonstration equipment
 - a. Visual charts
 - (1) Legible and readable at 50 feet
 - (2) Pointed to subject
 - (3) Limited number of ideas per chart
 - (4) To show basic methods which member can apply
 - b. Electrical equipment
 - (1) Suitable to area
 - (2) Available locally
 - (3) Simple rather than complicated
 - (4) Portable and fitted to available transportation
 - (5) High quality workmanship and correct electrically. Free from commercial favoritism.
 - c. Seasonal activities
 - (1) Ahead of farm need
 - (2) Followed by practical installations during time of farm use

3. Demonstration location and preliminary arrangement

a. Housing

- (1) Adequate for group
- (2) Suitable for climate or season
- (3) Centrally located for group interested
- (4) Typical of conditions of majority

b. Lighting

- (1) Increase illumination when necessary
- (2) Shade bare fixtures
- (3) High light equipment

c. Heating

- (1) Check heating capacity of stoves and furnaces
- (2) Use electric fans to distribute heat
 - (a) Effective demonstration of electric applications
 - (b) Improves audience attention

d. Staging

- (1) Visibility important
- (2) Cover distracting backgrounds
- (3) Place and check all equipment before demonstration time
- (4) Group participation

e. Literature

- (1) Limited in amount
- (2) Pointed to need
- (3) Simple
- (4) Eliminate commercial favoritism

4. Level of presentation

- a. Never beneath group
- b. Never above ability of group

5. Local organization tie-in

a. Extension service

- (1) State specialists
- (2) County and home agents
 - (a) Agent meetings
 - (b) Farm leaders
 - (1) 4-H club
 - (2) Adult farmers

b. Vocational agriculture

- (1) State supervisors
- (2) High school teachers
 - (a) Vocational agricultural teacher
 - (1) High school students (future farmers)
 - (2) Adult farmers and home-makers
 - (3) Veterans' training
 - (b) Home economics teacher
 - (1) High school students (future home-makers)
 - (2) Adult women

- c. Existing farm organizations (such as)
 - (1) The Farm Bureau
 - (2) The Grange (where available)
 - (3) Farmers Union (where available)

B. Practical Demonstrations - Instruction

For demonstrating electrical applications under practical conditions. Placed on member's farm who is recognized as a community leader and successful in the type of production to which the application applies. The appliance should be metered and records kept of power consumption, the results of the application and other information pertinent to the conditions under which the demonstration occurred.

a. On individual farm - Result demonstrations

- (1) Farmers greatest interest
- (2) Limited to one or two uses only
- (3) Metered for consumption data
- (4) On recognized leader in that field of production
- (5) Typical of majority of people in community
- (6) Records to be kept by member
- (7) Results made available to members
 - (a) By news publications
 - (b) By group or individual visits to farm
 - (c) Have member participate by giving information to visitors.

C. Speeches:

Useful in presenting subjects of general interest where only broad concepts are to be taught. May be used to coordinate details already known to the listeners, but ineffective in teaching unknown techniques or unknown concepts in which details are of prime importance.

D. Group Discussions:

Excellent for exchange of information between the members of the group. Not suited to presenting new information.

E. Farm Visits:

Useful in teaching skills, techniques, and details applicable to the individual situation. Wasteful of time for teaching broad concepts of general interest.

F. Office Calls:

Useful in coordinating details already known. Not applicable to teaching techniques or skills, and wasteful of time for teaching broad concepts of general interest.

G. Personal Letters:

Useful in coordinating known details of individual situations. Applicable to much the same teaching as office calls except that the instruction must be still narrower and more limited.

H. Circular Letters:

Useful in coordinating a few known details of general interest. Limited to one or two closely related details per letter. Adapted to general announcements.

I. Member Newsletters:

Perhaps the most useful single medium but must be skillfully prepared to be most effective. May be used to teach broad concepts, and the coordination of known details of general interest. Relatively ineffective for teaching unknown details, techniques, and skills.

J. Daily and Weekly Newspapers:

Limited to teaching broad concepts of wide general interest. Very useful for this purpose.

K. Radio:

Suited to the same type of teaching as newspapers but limited to still broader aspects of the subjects. Very useful, economical of time, within this limitation.

IV. The Relation of Electricity to Agriculture

"Electricity Plus" is rapidly becoming the economic factor that is bringing additional profits to the farm. Electricity plus good management practices, proper methods, and good technique are a combination that can and will get the results on the farm which may have been obtained in our experiment stations. With approximately 65 percent of our farms electrified, it is now possible to extend experiment station methods, excellence of control, and uniform results to the individual farm, on a scale never before possible. Electricity will bring the climax and fulfillment of scientific agriculture largely because it eliminates much hand labor, takes the guesswork out by controlling conditions and makes easy the application of heat, cold, and light in obtaining desired results.

Since the beginning of established agriculture, there has been a constant search for methods to eliminate as much hand labor as possible in farm as well as in factory production. This search resulted in harnessing the ox and the horse. Field tillage equipment has been powered by animals from earliest history to the present day. In about 1800, animal power was first successfully applied to seeding, harvesting, and threshing machinery. These applications were largely responsible for the rapid mechanization of agriculture that has occurred since the reaper was invented. Wind and water power have also been applied for centuries in pumping water and grinding flour and feed. But these two sources were so limited in application that they constituted only a small portion of the total power needed and used in agriculture. The invention of the steam engine offered agriculture the first profitable mechanical power. Before steam could be widely applied the internal combustion engine was developed and the two were immediately in direct competition. Steam power was quickly eliminated on the farm because of the gas engines' increased profitability, lighter construction, and easily supplied fuel. Internal combustion engine power was so versatile that it also rapidly replaced animal power. In 1920 the horse and mule population of the U.S. was approximately 20,000,000 animals. In 1940 their number dropped to less than 12,000,000. This decrease was almost entirely due to the use of trucks and tractors in place of draft animals.

As the tractors improved and their adaptability increased, they were used more and more for all types of farm work and power needs. The extension program of 1915 to 1920 advocating the use of a tractor for 1,000 hours per year, to justify the purchase

of a tractor, did much to promote the development of belt machinery. Such equipment is designed to fit the tractor to insure its economic operation. Most tractors in turn are selected to supply the power necessary to get the spring plowing done on time. Since this is generally the heaviest work to be done on the farm the tractor has more power than is required to do most other farm work. Consequently machines designed to fit the tractor are generally larger than would be required to do their particular job on most farms. This is especially true of crop processing machinery. Obviously when the tractor or gas engine is the only major source of power it is good business to operate it efficiently when it is in use. This was the sales program which placed much oversized machinery and equipment on many farms. The program was economically sound for a period of twenty to thirty years, when tractors were the only major power available but it has resulted in educating the farmer to use large capacity machines, demanding a peak labor supply, and a minimum of time for any one task. It has also resulted in a large investment in equipment, the employment of temporary extra labor for threshing, feed grinding and silo filling and similar power work. The net result may be said to have caused uneconomic investment in machinery and excessive expenditures for labor in relation to the amount of belt power work to be done on many farms.

Rural electrification constitutes a modern revolution in the application of power to agriculture and in the selection of equipment necessary to do required work. Because of its flexibility and accurate control, smaller units operating on a semi- or fully automatic basis can be made to reduce labor demands to a minimum. The overall efficiency of small machines, working long periods with minimum manual attention is not only much greater but the investment in equipment is also greatly reduced. Proper application of electric power can and will reduce seasonal labor demands for crop processing and in the time spent in every day chore work.

Motors may readily be substituted for muscles in most daily tasks. The 1/4 horse power electric motor will do the work requiring three or more men at various types of tasks such as the pumping of water, driving a one-hole corn sheller, turning a cream separator, a grindstone, a churn, a foodchopper, and many other tools and tasks. In addition a great variety of tasks and operations can be done by electric power which, without it, would be difficult to accomplish or impractical to attempt. Heat applications are particularly easy to use. These include brooders

for chickens and young animals such as sheep, pigs, and calves, heating the soil in hot beds, soil sterilizing, for weed and insect control, water heating using internal, external, or immersion type heating units or elements.

Home subsistence opportunities and methods are greatly extended and improved when electric power is available. For the first time many families will be able to preserve high quality food for home consumption that will be of equal or better quality than that displayed on the local grocers' shelves. Home canning, quick freezing, and dehydration of fruits and berries are fields especially promising in the use of electric power. Thermostatic heat and cold control take the guesswork out of kitchen processing.

The production of many kinds of farm produce can be greatly increased, and the quality improved by the use of electric power. Special fields include garden watering to maintain production through dry periods. Insect and weed control applications are readily made. These include light traps, electric screens, and soil sterilizing equipment all readily adaptable to farm conditions.

In the refrigeration field, freezers, walk-in refrigerators, cold storage rooms of large capacity for perishable products usually marketed seasonally and milk coolers greatly extend refrigeration benefits beyond the kitchen. All of these and many more applications may be used in helping to solve the problems which have always confronted agriculture. Without electricity many of these applications could not be developed at all, while in other cases the cost or difficulty of establishing them made their use impractical. The farmer who can incorporate the many possibilities of using electric power into his farm business is definitely on the road to increased income, a higher standard of living and reduced labor requirements.

In closing it may be said that these applications must be planned over a period of years, as much in advance as possible, if the changeover to electric power is to be made to the greatest advantage and at a minimum expense.

V. Home Lighting

A. Lecture-demonstration

1. Importance of good lighting:

- a. Increase in eye defects corresponds to increase in eye use under artificial light (statistics showing effect of schooling, age and occupations involving close work).
- b. Research shows value of good lighting (effect of improved school lighting on scholarship and behavior; relation of quantity of light to rate of eye blinking and heart beat; ability to distinguish fine detail).
- c. Experience of users shows good lighting protects eyesight, reduces accidents, saves time, makes work easier, adds beauty and cheer.

2. Considerations in planning lighting:

- a. Essentials of good lighting
- b. Money available for lighting
- c. Family activities, habits
- d. Decorative harmony
- e. Maintenance and service
- f. Relation to wiring design

3. Measurement of light (cause) and lighting (result)

- a. Units of measurement: footcandle (amount); footlambert (brightness)
- b. Instrument of measurement, the lightmeter; its proper use.
- c. Recommendations for different tasks or activities in the home.
- d. Comparison of indoor and outdoor lighting measurements

4. Essentials of good lighting; related factors

- a. Quantity - enough light. Size bulb (greater efficiency of high-wattage lamp bulbs; single- vs. multiple-bulb equipment); voltage; color (bulb, shade lining, ceiling, walls); bulb blackening, dirt and dust; shade (effect with shade, without shade; slanting vs. drum shape); diffusing materials; shadows; distance. General rule on size of bulbs, tubes.
- b. Quality - comfortable light - pleasing in brightness and color; steady. Diffusion and shading (comparative comfort of seeing with clear, inside-frosted and silvered-bowl bulbs -- bulb in diffusing reflector bowl -- bulb in shaded diffusing reflector bowl. Relation to freedom from direct and reflected glare and harsh shadows. Effect of finishes, dull vs. shiny. Balance (ratio of general lighting to local lighting; ceiling fixture vs. lamps as method of providing general lighting. General rules on relation of bulb wattage to bowl size, of fixture size to room size; of general lighting to local lighting.

5. Types of lighting equipment:

- a. Sources - incandescent, fluorescent (advantages, disadvantages)
- b. Lamps - table, floor, wall, dresser, bed. Night lights.
- c. Fixtures - ciling and bracket

6. Recognition of good lighting equipment:
 - a. Method of distributing light (indirect, semi-direct, general diffuse, semi-direct, direct). Evenness of distribution (in fixture, in room).
 - b. Certification of lighting equipment (CLM, AHLI, RLM, Fleur-O-Lier)
7. Good lighting installation practice (application of essentials to activities in home in room-by-room discussion on selection and location of equipment for general and local lighting) applying general guide rules on:
 - a. Size of wattage of bulbs and tubes
 - b. Relation of bulb-wattage to bowl size.
 - c. Relation of fixture size to room size.
 - d. Relation of general lighting to local lighting
 - e. Economy in initial and operating cost
 - f. Convenience in control and use through good location of switches and convenience and lighting outlets.
8. Modernization of poor lighting equipment:
 - a. Adaptors, candle shades and other shades for bare-bulb fixtures.
 - b. Conversion units for portable lamps.
 - c. Silvered-bowl lamp bulbs for lamps and fixtures.
9. Care and cleaning of lighting equipment.
10. Summary (essentials of good lighting; guides for bulb or tube sizes).

References: Lighting References, REA
Lighting the Farm Home, REA
Planning Your Farmstead Wiring and Lighting, REA
Making Light Work for You, REA

B. Laboratory Practice

1. Planning lighting installation. Use NAWB* student project sheets for living room, kitchen and laundry.
 - a. Mark location of switches, convenience and lighting outlets.
 - b. Label floor plan with type of fixture or lamp planned for each location and wattage and kind of bulbs or tubes to be used.
 - c. Correct project sheets, using answer pages in "Electric Wiring" and NAWB wall chart for this.
2. Figuring cost of lighting. Figure approximate cost of lighting installation planned above.
 - a. Use low-cost figures based on group fixture offers** (\$20, \$30 or \$40 for groups including 2 porch, 1 hall, 1 living room, 1 dining room, 1 kitchen and 3 bedroom fixtures; home-made lamps at \$5 each).

*National Adequate Wiring Bureau, see references.

**At least two and possibly other group purchase lighting fixture offers are being made.

- b. As a home exercise, figure cost using local costs of equipment you would like for your own use.
- c. Figure monthly operating cost of one of the study lamps with 100 w bulb, used 2 hours per night at 5¢ per kwh.
3. Measuring light. Use REA "Lighting for the Home" data sheet and record measurements to show effect on quantity of light of:
 - a. Size or wattage of bulb.
 - b. Finish, color and blackening of bulb.
 - c. Distance from source of light.
 - d. Type of diffusing material in reflector bowl.
 - e. Effect of shading (with or without shade, color of lining, shape).
4. Constructing equipment. Use the leaflet, "Make This Table Lamp", unassembled parts and a completed home-made lamp.
 - a. Identify parts by name.
 - b. Following directions, fit parts together to gain understanding of construction.
 - c. Construct or assist in constructing lamp at earliest convenience.
5. Modernizing poor equipment. Carry out following conversions individually or in groups of two or more:
 - a. Bare 100 w. bulb in socket to adaptor fixture.
 - b. Bare 40 w. bulb in socket (such as wall bracket or cluster fixture) with white plastic candle shade.
 - c. Goose-neck lamp conversion using screw-on 8" plastic diffusing reflector bowl and 16" or 18" shade with white lining.
 - d. Pin-up conversion using screw-on 6" plastic diffusing reflector or candle-cup to convert bare-bulb pin-to-wall lamp to reading-type pin-to-wall lamp.
 - e. Oil-lamp conversion using oil-lamp adaptor with screw-on 6" plastic diffusing reflector and 10-14" shade for lamps under 20" in overall height or screw-on 8" plastic diffusing reflector and 16-18" shade for taller lamps. Convert lamps with bases under 10-12" to bare-bulb dressing table lamps using clip-on 10" shade.
 - f. Dark shade-lining to light shade-lining, cutting white paper liner after drawing liner on white paper by tracing along edges while rolling shade.

References: Electric Wiring - Its Relationship to Modern Homemaking, National Adequate Wiring Bureau, 155 E. 44th St., New York 17, N.Y. (One copy free; includes card to order 50 each of four project work sheets free; extra bulletins 25¢ each, work sheets, 1¢ each).

Lighting for the Home, Data Sheet, REA
Make This Table Lamp, REA
Make Your Oil Lamp Into an Electric One, REA

SUGGESTIONS: To meet time limitations in setting up and directing the above practice activities, the following suggestions on each activity may be helpful:

- 1 & 2. May be homework assignment. For correction, refer group to answers in NAWB's "Electrid Wiring" or discuss completed project work sheets as group. This exercise may also be combined with wiring practice. Use all four study project sheets if used to teach wiring also.
 3. May be performed individually, by groups of two or more or by instructor using a projection lightmeter and having the group record results on the REA data sheet "Lighting for the Home."
 4. May have group drill for part 4a. Part 4b can be set up to be handled with 5. Part 4c can be done at home alone or in a group, using a carpenter or a shop class' help in advance cutting of parts.
 5. May divide entire group into six rotating teams and assign each to a section of Activity 5. Set and call a time limit for teams to move on to an adjoining part of the activity. Can be combined with 3 and 4b if group is large (divide group into at least 11 teams in this case).
- C. Activities in a Lighting Program. The educational committee for an electric cooperative should consider planning a lighting program. The fall months, when a new school year starts, is a good time for activities in such a program to begin, though they are suitable any time. Cooperative management and leadership may:
1. Publicize program and get information on good lighting to members through newsletter, newspapers, radio and direct mail.
 2. Hold demonstration meetings with members. Precede these with work with dealers
 3. Give demonstrations and/or show lighting movie on school assembly programs, in classes or at club meetings.
 4. Encourage making of home-made lamps and conversion of oil lamps.
 5. Obtain maximum participation of homemakers clubs as well as other adult and youth groups in lighting activities, such as 2, 4 and 6.
 6. Set up well-lighted demonstration homes throughout area and sponsor tours of youth and adult groups to see lighting installations.
 7. Have good lighting displays set up in cooperative office, dealers stores, offices of educational workers; at special meetings, fairs.
 8. Provide each school principal in area with bulletin, "Teaching About Light and Sight," NEA. Discuss suggested curriculum topics in it. Offer to provide bulletins to teachers concerned and to meet with group and show literature and movies in a lighting field. Invite educational leaders of other adult and youth groups.

9. Work with school officials to get demonstration installations of good lighting in schools. A similar program can be developed in other public or semi-public buildings.
10. See references for other suggestions.

References: Suggestions on a Planned Farmstead Lighting Program, REA Teaching About Light and Sight, National Education Association, 1201 16th Street, Washington, D. C. 30¢.

SUGGESTIONS: Either through discussion or as home work assignment, the following activities might be carried on:

1. Developing lighting demonstrations:
 - a. Choose three or four points from lecture-demonstration outline that would combine well for brief consumer demonstration to typical group, such as:
 - (1) Members with unwired houses.
 - (2) Members who have had electricity for a long time.
 - (3) High school home economics class; or shop class.
 - b. List minimum equipment needed for one of above demonstrations.
2. Selecting demonstration equipment:
 - a. List minimum equipment for lighting demonstrations by an electrification adviser.
 - b. Decide on desirable characteristics of this equipment.

VI. Converting Hand Powered Equipment to Electric Drive

Lecture Demonstration

A. Farmer conservative buyer.

1. Does not buy to set or meet standard.
2. Does not discard serviceable equipment.
3. Tends to delay purchase of electrical equipment.
 - a. So long as hand tools are serviceable.
 - b. Delay reduces desire for electrical equipment.
 - c. Until wiring and light costs are recuperated.

B. Power requirements of hand driven machines.

1. Limited to 1/4 H.P. or less.
2. Man power approximately 1/10 H.P.
3. For continuous effort 1/4 H.P. motor equal to about 4 men.

C. Application Problems.

1. Speed reduction
 - a. Motor high speed - 1750 RPM.
 - b. Hand crank (slow speed) 100 RPM or less.
2. Pulley Ratios for speed variation
 - a. Diameter of Pulleys
 - b.
$$\frac{\text{RPM of motor}}{\text{RPM of machine}} = \frac{\text{Driven pulley diameter}}{\text{Motor pulley diameter}}$$
3. V-Belt Drives
 - a. Most efficient.
 - b. Sizes.
 - (1) Fractional H. P.
 - (2) A size belt.
 - (3) B size belt.
 - c. Multi belt drives (not applicable here).
 - d. Easy to align.
4. Rockwood drive.
 - a. Maintains continuous tension.
 - b. Permits starting slippage.
 - c. Makes belt tension and power transmission simple.

D. Motor Table

1. Permits quick easy mounting of machine.
 - a. Perfect belt alignment.
 - b. Rigid mounting.
2. Motor shelf
 - a. Weight of motor and shelf keep belts tight.
 - b. Permits few belts to serve many variable size machines.
 - c. Jack shaft speed reduction.
 - (1) Necessary for slow speed machines

- (a) Less than 300 RPM
- (b) Reduces ratio motor speed to machine speed
- (c) Permits use of smaller pulleys
- (2) Calculation method
 - (a) Obtain speed of shaft by pulley ratios
 - (b) Obtain speed of machine from drive pulley on jack shaft

Practice Shop Activity

F. Construct Table

1. Work out bill of materials
 - a. Wooden Members
 - (1) Legs - length and angle
 - (2) Aprons - Length - square ends or beveled
 - (3) Top - size
 - (4) Shelf - height from floor
 - (5) Bases for equipment - size and number
 - (6) Nailing strips - total length and widths
 - b. Metal parts of table
 - (1) Bearings - shaft diameter
 - (2) Shafting - length and diameter
 - (3) Motor rails
 - (4) Pulley sizes
 - (5) Screws and nails
 - c. Belting
 - (1) Number of belts
 - (2) Size and length of belt
 - (3) V-belts only recommended for electric motor
2. Cut materials
 - a. Legs
 - (1) 6° angle - tangent 1/10 (approximately)
 - (2) Length - 30" more or less
 - (3) Bore shelf pivot holes
 - b. Aprons - either square or 6° angle
 - c. Shelf sills and cover
 - (1) Bore shaft hole in sills
 - (2) Square shelf members
 - d. Strips for top and bases
3. Assemble parts
 - a. Legs to apron boards
 - b. Top to table
 - c. Strips to table top and bases
 - d. Sills to shelf cover
 - e. Motor mount and jack shaft
 - (1) Rail to motor and pivots to shelf
 - (a) Spacing for belt length
 - (b) Squaring for belt alignment

- (2) Pillow blocks or bearings to shaft
 - (a) Spacing
 - (b) Squaring with motor
- (3) Pulleys to jack shaft - alignment
- f. Shelf to table
- g. Tools and machines to bases
- 4. Square up pulleys for best alignment
- 5. Check operation of equipment

References:

- 1. The Small Portable Motor, REA leaflet
- 2. Make this Motor Table, REA leaflet
- 3. Farm Motors - Selection and Installations, REA leaflet
- 4. A Portable Motor for Practical Farm Use. Bulletin
University of Georgia, Agricultural Extension
Service, Athens, Georgia
- 5. Electric Motors for the Farm. USDA Farmers Bulletin
#1858, Price 5¢, Superintendent of Documents,
Washington, D. C.

VII. SUGGESTED PROCEDURES AND TECHNIQUES IN PROGRAM PLANNING

The successful development of a power use and member education program begins with careful and detailed planning in advance. It is becoming a common practice each year for cooperatives to prepare a budget estimate of their expenditures and receipts a year in advance. When dealing with an educational program involving all members of the cooperative and others interested in agricultural programs, it is equally important that definite discussion and consideration be given to the proposed activities. Programs on lighting, wiring, running water systems, selection and use of electric farm and home equipment, hay curing, refrigeration and home freezing, are examples of such activities. This planning is especially needed in view of the fact that the trend among cooperatives is to employ technically trained personnel (electrification advisers) to be responsible for carrying out the program as approved by the board of directors, under the direction of a power use committee, through the manager.

Some basic factors to be considered in the planning are:

1. Problems and needs of the cooperative members.
 - A. Growth and size of the cooperative since its inception.
 - B. Monthly KWH consumption of each class of consumer (farm, non-farm and commercial).
 - C. The trend of KWH consumption beginning with the first energized lines.
 - D. Financial position of the cooperative (operating ratio, status of payout, etc.).
 - E. Rate structure.
2. Study of the agricultural statistics of the area, including types of farming, major and minor enterprises, livestock, grain, hay, dairying, poultry production, acres in farms, acreage of different crops, value of different farm products. Such statistics may be obtained from the 1945 census of the respective counties in the cooperative area.
3. Analyses of farming practices and their seasonal nature as they relate to the use of electric power. Included among these are pig and poultry brooding, refrigeration and home freezing, crop handling and processing, and the less seasonal activities such as dairying, feed grinding, water heating, electric cookery, etc.
4. Coordinating the cooperative's program with those of established rural educational agencies: Extension service (county farm and home agents); Vocational educational departments; agricultural and home economics teachers; farm organizations (Farm Bureau, granges, etc.).

5. Statistical data, facts, figures and informational material should be prepared in advance. Any of these data, informational material, etc., qualifying the situation should be available in chart or mimeographed form for consideration at planning meetings.
 - A. Annual KWH consumption since inception of cooperative; monthly consumption for the last calendar year.
 - B. Load curves, demands and peaks.
 - C. Agricultural statistical data, etc.
6. To provide additional data and information that would be helpful to the cooperative in conducting the power use and member education program, the following types of surveys should be made:
 - A. Appliance and equipment survey among connected members, and among potential members. This may be done by sending a survey form to all members along with the cooperative's newsletter, or including it with the monthly billing. The monthly newsletter offers a good medium of explaining the need for this information and encouraging members' response. When completed, the committee along with the electrification adviser and manager, should study and analyze the data for subsequent guidance.
 - B. Make a survey of existing dealers and agencies handling electrical appliance and equipment, and specifically determining service available through dealers and distributors.
 1. Attitude of dealers and distributors.
 2. Ascertaining the proportion of such appliances and equipment available to rural consumers.
 3. Type and adequacy of servicing facilities.
 4. Equipment handled.

Such assembled information and data can be most helpful in planning a successful power use and member education program.

PLANNING THE PROGRAM

1. A program planning meeting should be held, preferably at the cooperative office, and attended by the following persons from the service area of the cooperative:
 - A. Co-op board of directors.
 - B. Other co-op members, selected to give geographical coverage.
 - C. Local county agent and home demonstration agent.
 - D. Vocational agriculture and vocational home economics teachers.

- E. County school superintendents.
- F. Representatives of other state or federal agencies dealing with agriculture (PMA, SCS, FHA).
- G. Representatives of farm organizations (Farm Bureau, Farmers' Union, Grange, etc.).
- H. Co-op personnel.

2. Chairman of this meeting should be a co-op member or official. He should be well informed about the agricultural conditions in the cooperative area, and experienced in conducting meetings; he should thoroughly understand the nature of a power use and member education program and be sold on the value of and need for such a program. The chairman should fully explain the significance and purpose of the meeting. He may delegate the electrification adviser or any other qualified individual to lead the discussion in formulating the approach under consideration.

3. Discussion Procedure.

- A. Leader should ask group, "What are your problems in the use of electric power as it pertains to increasing income on the farm and better living in the home?"
- B. Problems are listed on blackboard.
- C. When discussion and consideration of program is completed, chairman should get group to agree on (perhaps) 4 major problems. (Those representing the "professional" group should be asked about their program plans for the next year, and coordination with these plans should be discussed.)
- D. Chairman should entertain a motion that cooperative board be asked to appoint a committee (not more than 5) to be responsible for direction and supervision of program.
- E. This committee should determine the mechanics and methods to be followed in execution of the program and the calendar of activities.
- F. Consideration should be given by the committee to coordinating activities with those of existing agricultural agencies in the cooperative area.
- G. The board of directors should formally adopt the program at the next board meeting.
- H. Copies of the general overall program should be sent to all who participated in the program planning meeting.

- I. Copies of the calendar of activities and the program should be kept in the co-op's files.

Copies should be sent to Extension people, vocational people and/or others with whom joint educational programs will be conducted.

- J. The electrification adviser should use this calendar of activities and program as his guide.

The results of careful program planning are manifold. Here are the most important:

1. It offers the best medium through which to sell the value of a member education program in power use and cooperatives.
2. It provides a working plan for the initiating and carrying on of educational activities.
3. It encourages and stimulates leadership interest and training.
4. It secures active participation by the member, whose interest is better served and results in a stronger cooperative organization.
5. It provides a "measuring stick" by which the program may be evaluated.

Like all activities, there is an appropriate time for program planning. It is recognized, however, that in the beginning it will be necessary to make a plan for the cooperative immediately, regardless of the time of year. It is believed to be best that the first program developed should not cover more than 12 months. Once the program plan has been definitely established, subsequent meetings relating to it should be held in the fall (October or November). By so doing the next year's program can be completed, publicized and ready for action by the first part of the year, or soon thereafter.

VIII. Organization of a Program

There are three main points to be covered in organizing any program. They are: A. Planning; B. Conducting; C. Determining Results

A. Planning the Program

1. Determine the situation. This involves accumulating and interpreting facts and the development of the program on the basis of this determination. The methods of determining facts will vary with programs and with the type of information desired. For example, if a plumbing program is to be organized, information would be needed concerning the number of installations already in the area. This information could be obtained by a survey but reliable information as to the number of families interested in installing a plumbing system could not be obtained through a survey. Information as to availability of material and equipment might be procured from the industry, and information as to health regulations could be obtained from the local or state authorities. Information concerning the probability of securing adequate supplies of water in the area could be obtained from a state geologist or a comparable official.
2. Organize committees. This should be done in order to get the cooperation and assistance of all interested groups in planning and conducting the program. The interested groups would vary with the type and scope of the program and would include such groups as members of the cooperative, farm organizations, vocational groups, extension service, service organizations.
3. Determine the objectives.
 - a. Educational objectives. The educational objectives of a program will include one or more of the following:
 1. Change attitudes
 2. Increase knowledge
 3. Change habits
 4. Teach new methods
 - b. Subject matter. The subject matter should include not only that which deals directly with the program but also that which is related. For instance, subject matter for a farmstead wiring program might include such related subjects as water systems, plumbing, household and farm electrical equipment, house and farm rearrangement, lighting and financing, as well as that directly concerned with wiring.

- c. Goals. Goals should be set in any well planned program and should be publicized. The nature of the program will determine the nature of the goals. The goals for a program on the conversion of hand operated equipment to motor driven equipment might be in terms of the actual number to be converted and could be broken down into county or community goals. The goals for a program designed to change attitudes or increase knowledge might be in terms of the number of people attending meetings or participating in the program.

4. Developing the program.

This is the final and most important step under "Planning". It involves committee meetings to determine and announce the objectives, the goals and the methods to be used in conducting the program. Through these meetings the active participation and assistance of all interested groups can be enlisted and a well unified program can be insured.

B. Conducting the Program

1. Information concerning the program, its importance, the need for it, what it will mean to individuals and organizations, what is to be accomplished and how it is to be accomplished should be disseminated. Create interest and see that everyone in the area knows about the program. The type of program will determine the method of carrying it out. A power use program in an area having a shortage of power might be conducted without holding a meeting or giving a demonstration. The entire program might be carried out by means of radio, press, news letters and individual letters to leaders in other organizations, schools, community leaders, etc. To accomplish this it would be necessary to inform every user of electricity of the peak periods, the contributing factors to the peak and what action individuals may take to lessen the peak load. Continued publicity would inform them of the results of their actions and the significance of the results. A program to teach new methods might be organized entirely around lecture demonstrations with supporting publicity to create a desire to learn the method. Demonstrations may be given by local 4-H, F.F.A., community or other interested groups.

C. Determination of the Results

The results of a program must be determined in order to improve the methods and to make certain that the planning was adequate. Reports of the progress of the program should be publicized and the final results should also be determined and publicized.

IX. FUNDAMENTALS OF WIRING

1. Highline Power Supply.

- A. Generating Plant
 - 1. Steam generation
 - 2. Diesel generation
 - 3. Water power generation
- B. Substation Supply
 - 1. Three phase line from generating plant
 - 2. Many times, only single phase current is supplied to cooperative substation
- C. Phase Generation of Current
 - 1. Three phase sine curve
 - 2. Single phase curve
- D. Voltage at Transformer
 - 6900 to 7200 volts

2. Secondary Current Supply

- A. Transformer Connected to Single Phase Line
- B. Service Drop to Meter Loop
 - 1. Yard pole
 - 2. Building - house generally
 - 3. Two or three wire - 120-240 volts
- C. Meter Loop
 - 1. Puts current through meter
 - 2. Main service switch
 - 3. Returns to pole top
 - 4. Ground at pole for protection
- D. Farmstead Distribution
 - 1. From meter pole
 - a. To each building
 - b. Each building service grounded
 - 2. Single conductor between buildings determined by
 - a. Amount of current to be carried
 - b. Distance of building from meter
 - c. 2 wires for 120 volts
 - d. 3 wires for 240 volts
- E. Building Distribution
 - 1. Distribution panel or fuse box
 - a. Size depends on quantity of current to be distributed
 - 1. Amperage
 - 2. Voltage

3. Number of branch circuits
- b. Location
2. Circuit control
 - a. Fuses
 - b. Circuit breakers
3. Branch circuits
 - a. Lighting circuits
 1. 15 amperes
 2. No. 14 wire size (minimum)
 3. 120 volts
 - b. Appliance
 1. 20 amperes
 2. No. 12 wire size
 3. 120 volts
 - c. Special circuits
 1. Range circuit
 - a. 35 or 50 amperes
 - b. 20 volts
 - c. Circuit wire size
 1. Depends on amperage - Generally #6
 2. Distance from panel to appliance
 2. Water heater circuit
 - a. 20 amperes
 - b. 240 volts
 - c. Circuit wire size
 1. Depends on amperage
 2. Distance from panel to water heater
 3. Power outlet
 - a. Amperage for load
 - b. 240 volts
 - c. Conductor or wire size
 1. Depends on amperage
 2. Distance from panel
 4. Surface outlets
 - a. Light outlets
 1. Location
 2. Outlet boxes
 3. Fixture holders
 - b. Switch outlets
 1. Location
 2. Outlet boxes
 3. Type of switch
 - a. Toggle switch
 - b. Mercury switch
 - c. Single pole switch
 - d. Three way switch
 - e. Four way switch
 4. Cover plates
 - a. Single switch
 - b. Multiple switch
 - c. Color of plate

- c. Convenience outlets
 - 1. Location
 - 2. Outlet boxes
 - 3. Types of convenience outlet
 - a. Single outlet
 - b. Double outlet
 - c. Polarized outlet
 - d. Dust proof outlet
 - e. Heater proof outlet
 - 4. Cover plates
 - a. Single outlet cover plate
 - b. Double outlet plate
 - c. Multiple outlet plate
 - d. Color of plates
 - 5. Conductor connections
 - a. All connection inside of boxes.

X. AN ELECTRIC ECONOMY FOR AGRICULTURE

Definition:

The application of electric power to farm production for the purpose of increasing and maintaining farm income in cash or kind to pay for the cost of needed and desired equipment and to provide the funds for meeting a large monthly power bill.

Presentation:

The electrification of the farm requires planning. Planning to use electricity to reduce physical work to a minimum, planning to increase production, to improve the quality of produce, to reduce losses from spoilage, and to improve the standard of living for the farm family. In order to accomplish complete farm electrification without jeopardizing the farm budget it is necessary to apply electric power in such a way that the added income will offset the increased cost and maintenance of electric equipment and the power bill. Such a program will, on most farms, require several years for completion.

To prevent mistakes and over-development an electrification plan should be made by each farmer. This plan would include a list of the farm activities by which the family obtains its cash income and which produces the food, clothing, fuel, and supplies used at home. Activities which the family would like to establish should also be included because frequently the efficient use of electric power will save the family enough time to do the things which they could not previously do.

TABLE I

EXAMPLE OF FARM PRODUCTION PLAN

<u>Present Production</u>	<u>Desired Increase in Production</u>	<u>New Activities</u>
1. Raising 500 chicks	1,000 broilers	
2. Keeping 300 laying hens		
3. Milk 10 cows	10 milk cows	Sell 100,000 lbs. Whole Milk Yearly
4. Sell 2,000 lbs. cream	(Drop cream production)	
5. Raise 1 acre garden		
6. Raise 25 pigs yearly		Butcher own beef and pork
7. Make 30 tons alfalfa	Raise 70 more tons alfalfa hay yearly	Cure hay in barn
8. Raise 100 acres corn		Dry corn arti- ficially

In addition to the production plan illustrated in Table 1 the electrical applications which can be made to the activities in the production plan should be listed.

TABLE II

ELECTRICAL PRODUCTION APPLICATIONS

<u>Activity</u>	<u>Application</u>	<u>Yearly Kwh Increase</u>	<u>Increase-Income (Estimated)</u>
1. Poultry	1. Night lighting 300 laying hens	100 kwh	(\$100.00
	2. Water warming	360 kwh	(
	3. Brooding 300 chicks	300 kwh	(
	4. Brood 1,000 broilers	1,000 kwh	\$200.00
2. Dairy	1. Milking machine for 20 cows	300 kwh	(\$600.00
	2. Milk cooler for 4 cans	1,200 kwh	(at 50¢ per 100 lb. net
	3. Barn cleaner	100 kwh	(
3. Gardening	Water 1/2 acre garden using 350 GPH deepwell pump	500 kwh	\$50.00
4. Swine	3 pig brooders	75 kwh	\$45.00
5. Hay	Dry 100 tons alfalfa	6,000 kwh	\$500.00
6. Grain	Dry 4,000 bushels corn		\$300.00 (saved corn 300 bushels)
7. Meat Pro- duction	Freezer - 25 cubic feet	1,500 kwh	\$100.00
		Annually - 11,435 kwh	\$1,895.00 Annually

Obviously the above increased production would require a large sum of money to buy the livestock, the electrical equipment, pay the power bill, and to buy seed, fertilizer, and perhaps machinery for such a changed program. Few could do it in one year. Therefore it should be planned for a 3, 5, or 10 year program as desired. The total cost for buying the electrical equipment, animals and other expenses should be listed as in Table III.

TABLE III

TOTAL COST OF EQUIPMENT, ANIMALS, ETC.,
FOR THE ELECTRIFICATION OF THE
PROPOSED NEW PLAN

<u>New Purchases</u>	<u>Estimated Cost</u>
1. Farmstead wiring	\$400.00
2. Farmstead lighting	150.00
3. Electric iron	12.00
4. Radio	100.00
5. Washing Machine	150.00
6. Kitchen Refrigerator	200.00
7. Electric Range	200.00
8. Water Heater	150.00
9. Water Pump (Deep Well)	200.00
10. Chicken Brooders (4)	150.00
11. Water Warmers (4)	12.00
12. Milking Machine	200.00
13. Milk Cooler	400.00
14. Barn Cleaner	500.00
15. Garden Watering Equipment, Pipe, Sprays, Deepen Well	100.00
16. Pig Brooders (3)	30.00
17. Hay Drier	750.00
18. Grain Drier (Use hay drier fan and motor)	250.00
19. Freezer (25 cubic feet)	350.00
	<u>\$4,304.00</u>

It will be noted that the cost is nearly twice the estimated yearly returns from electrification and increased livestock and equipment inventory. Thus it would require from 5 to 10 years to get the program fully developed. The time required would depend on the member's capital, his success in increasing production and income and the trend of prices for produce during the period. His choice of purchases would determine the increase in revenue. But if the following chart were used as shown, the member could within six months begin to obtain sufficient new income to pay the cost of current and to amortize the investment in equipment, thereby permitting new purchases with the recuperated capital.

A

Higher

Living Standard

1 Pig Brooder Will Net Annually \$15
Saves 1,1/2 Pigs A Litter
25 KWH Used Annually
100 Watt Lamp For Heat

8 Cu. Ft. Refrigerator Will Net
Annually \$100
Keeps Cream Sweet
Prevents Food Spoilage
Preserves Food Quality
Requires 600 KWH Annually

1/4 Acre Garden Will Net Annually \$50
1 Inch Of Water Per Week Will
Increase Yield 2 to 10 Times
Improve Quality Greatly
Permit Successive Planting
Requires 500 KWH Annually

300 Laying Hens Will Produce Annually \$100
Night Lighting Requires 100 KWH Annually
Water Warming Requires 360 KWH Annually
Brooding 900 Chicks Requires 1350 KWH Annually
Building For Complete Farm Electrification

BASIC AGRICULTURAL DATA

- XI. The electrification of a farm community is largely dependent upon the agricultural production of the area. On highly productive farms there is generally a correspondingly higher cash income. Communities where such farms predominate can more readily expend the money necessary for complete electrification. The type and kind of farm activities also determine where the farmer can employ electricity to the greatest advantage.

The electrification adviser who has full knowledge of the agricultural production in his area will have a dependable foundation upon which to build his power use program. Basic agricultural information essential for the best work of an electrification adviser can be quickly and easily obtained from the United States Census of Agriculture which is taken and assembled every five years. The information obtained in 1945 is now available for each state and county.

This information is published in book form for each state and can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., Price \$2.00. If you want the book for your state in a hurry you can always find one in the County agent's office.

The following pages of this booklet contain information on how and where to get much of the basic information you will need in working with the farmer members of your cooperative. The information listed may be obtained from county tables numbered from I to VIII in the State Census books and the headings and sub-headings will be found exactly as listed and in order from front to back of the book. If the cooperative serves more than one county the information for each county served should be assembled separately. Be sure to obtain the State Census book for your files. You will find many uses for it.

UNITED STATES DEPARTMENT OF AGRICULTURE
Rural Electrification Administration

BASIC AGRICULTURAL DATA FOR COOPERATIVE USE

COUNTY TABLE I

Farms - Acreage and Land

1. Number of farms in each county served.
2. Proportion of land in farms.
3. Average size of farms in each county served.

Note: (We recommend that each adviser get percent rural and urban population).

Farm Valuation

1. Average value land and buildings per farm (all)
2. Value of implements and machinery
 - a. Number of farms
 - b. Total value
 - c. Average value (compute)

Dwellings per Farm

1. Total farms reporting.
2. Number of dwellings.

Farm Operators

1. White - (number)
2. Non-white - (number)

Facilities

1. Running water
2. Electricity
3. Radio
4. Telephone
5. Electric distribution line within 1/4 mile

6. Motor trucks on farms
 - a. Farms reporting
 - b. Number
7. Tractors on farms
 - a. Farms reporting
 - b. Number
8. Automobiles on farms
 - a. Farms reporting
 - b. Number

COUNTY TABLE II

Crops

The electrification adviser or educational worker in power use should select the crop information for the 6 to 10 or more most important crops in his area.

1. Corn harvested for grain.
 - a. Farms reporting
 - b. Acres
 - c. Bushels
2. Wheat threshed or combined.
 - a. Farms reporting
 - b. Acres
 - c. Bushels
3. Hay is the second crop in both value and acreage in the United States. The selection of the type or kind of hay will depend on the area. Hay driers are especially valuable in the production of legume hays such as alfalfa, clover, and lespedeza. Select the most important hays and obtain the farms reporting, acreage, and tonnage for each kind of hay.
4. Miscellaneous Crops.

Select the crops that are of importance in the areas, such as cotton, peanuts, and sweet potatoes in the south and harvested soybeans, clover seed, flax, oats for grain in the north, and proper recognition for specialty crops such as citrus fruits, cherries, and commercial vegetables where applicable. See part 3 of county table II.
5. Value of vegetables grown for farm household use.
 - a. Farms Reporting
 - b. Dollars

COUNTY TABLE III

Livestock and Livestock Products

1. Sows and gilts for spring farrowing.
 - a. Farms reporting
 - b. Number
2. Ewes kept for breeding.
 - a. Farms reporting
 - b. Number

Farm Slaughter

1. Cattle excluding calves.
 - a. Farms reporting
 - b. Number
2. Calves
 - a. Farms reporting
 - b. Number
3. Hogs and pigs
 - a. Farms reporting
 - b. Number

Dairy Animals

1. Cows and heifers milked
 - a. Farms reporting
 - b. Number
2. Milk produced
3. Whole milk sold
 - a. Farms reporting
 - b. Gallons
4. Cream sold
 - a. Farms reporting
 - b. Pounds
5. Butter sold
 - a. Farms reporting

Poultry

1. Chicken eggs produced
 - a. Farms reporting
 - b. Dozen
 - c. Average per farm (calculate)

2. Chickens raised
 - a. Farms reporting
 - b. Number
 - c. Average per farm (calculate)

Note: (Get data on turkeys where production is important).

COUNTY TABLE IV

Value of Farm Products by Source

1. Average value per farm of all products sold and used.
2. Average value all farm products sold (compute).

Note: (Because of the importance of electricity in dairy and poultry production, it is suggested that the percentage of income derived from various sources be determined. It will be necessary to make calculations from material in the census).

COUNTY TABLE V

Farms by Tenure of Operator

1. Number of full owners.
2. All tenants (Number)

Note: (In the south the number of croppers should be given).

COUNTY TABLE VII

Farm Classification by Total Value of Farm Products

1. Farms under \$250 annually.
2. Farms over \$1,500 annually (Compute)

COUNTY TABLE VIII

The electrification adviser should study county table Viii to determine classes and types of farms and the relative importance of each. The relation of farm production for home use and for commercial production should be determined because a large proportion of farms in the former class will definitely limit the use of electric power.

SOME FACTORS TO CONSIDER IN PLANNING ELECTRICAL EQUIPMENT PURCHASES

General Points related to Planning:

- Family -- size, habits needs, goals
- Amount of money family has to spend
- Responsibility of co-op members to use electricity for co-op success
- Advantages of electrical equipment
- Importance in relation to health
- Condition of equipment now in use
- Initial cost of equipment to buyer
 - Types available; models
 - Features and their uses
 - Materials and workmanship
- Equipment dimensions; space available
- Installation costs
- Cost of remodelling structures to obtain full use of equipment
- Operation cost (kwh consumption)
- Maintenance cost
- Money-saving and income-producing possibilities of equipment
- Possibilities of financing purchases
- Desirability of planned purchasing

Points on Specific Pieces of Equipment:

- Reliability of manufacturer
- Dependability of local dealer
- Guarantee; servicing facilities
- Safety approval (UL); safety features
- Sturdiness in construction
- Durability in finishes
- Simplicity of design
- Ease of cleaning
- Convenient controls
- Plain and complete markings
- Complete instructions

For brief summary of points related directly to individual pieces of equipment see "Main Points to Consider when Electrifying the Rural Home" and working outlines on various types of equipment, REA.

ELECTRICAL USE IN THE HOME

LIGHTING:

FIXTURES:

CEILING

BRACKET

BUILT-IN EQUIPMENT

PORTABLE LAMPS:

TABLE, FLOOR & WALL

DRESSER, BED & NIGHT

ADAPTORS, SHADES

EDUCATION AND RECREATION:

RADIO, TELEVISION, RECORDER

PHONOGRAPH, RECORD CHANGER

WORKSHOP TOOLS

MOVIE & SLIDE PROJECTORS

PHOTOGRAPHIC EQUIPMENT

ELECTRICAL TOYS

HEALTH, GROOMING, SLEEP

ULTRA-VIOLET OR SUNLAMP

INFRA-RED OR HEAT LAMP

GERMICIDAL LAMP

VAPORIZER

VIBRATOR OR MASSAGER

SHAVER OR RAZOR

HAIR DRIER

HEATING PAD, SHEET, BLANKET

FOOD PREPARATION, SERVING & STORING:

REFRIGERATION:

HOUSEHOLD

FREEZER

WALK-IN

SEPARATOR, PASTEURIZER & CHURN

RANGE, HOTPLATE, ROASTER

SMALL APPLIANCES:

MIXER, COFFEE MAKER

TOASTER, WAFFLE BAKER, ETC.

DISHWASHER, TEAKETTLE

LAUNDRY, SEWING, CLEANING, GENERAL HOUSEWORK:

WASHING MACHINE

CLOTHES DRIER

IRON, IRONER

CLOCK, CONTROLS

SEWING MACHINE

VACUUM CLEANER

SANDER & POLISHER

PEST EXTERMINATOR

INCINERATOR

PAINT SPRAYER

RUNNING WATER:

PRESSURE WATER SYSTEM

PLUMBING (NON-ELECTRICAL)

AUTOMATIC WATER SOFTENER

WATER HEATER

WASTE DISPOSAL SYSTEM

HEATING & COOLING:

PORTABLE HEATER

HOUSE HEATING EQUIPMENT

FAN, ROOM COOLER

AIR CLEANER; AIR CONDITIONER

HUMIDIFIER, DEHUMIDIFIER

WIRING

PROTECTIVE DEVICES (FUSES, CIRCUIT BREAKERS)

CIRCUITS:

GENERAL PURPOSE

APPLIANCE

SPECIAL APPLIANCE

OUTLETS:

CONVENIENCE OUTLETS

LIGHTING OUTLETS

SWITCHES

TIME-SAVING WITH ELECTRICAL HOUSEHOLD EQUIPMENT: Figures given below in number of 8-hour days saved are some averages of studies made.

Water system	28	Range	14	Iron	10
Lighting	22	Dishwasher	14	Vacuum cleaner (6-1/2-32)	9
Washer	6-20	Ironer	11	Refrigerator	8-1/4

ENERGY-SAVING WITH ELECTRICAL HOUSEHOLD EQUIPMENT: Few energy-saving studies involving electrical household equipment have been made. Figures below show labor-saving possibilities of modernizing laundry tasks. Some of these tasks can be eliminated by automatic equipment.

ENERGY COST ABOVE RESTING FOR IRONING

94%	SADIRON
79%	ELECTRIC IRON, STANDING
62%	ELECTRIC IRON, SITTING
60%	IRONER - FLAT PLATE
45%	IRONER - ROTARY

ENERGY COST ABOVE RESTING FOR WRINGING

197%	HAND WRINGER
138%	BY HAND
125%	ELECTRIC SPINNER
99%	ELECTRIC WRINGER

ENERGY COST ABOVE RESTING FOR SOME LAUNDRY TASKS

191%	WASHING BY HAND
161%	RINSING BY HAND
184%	HANGING CLOTHES
139%	EMPTYING WASHER
149%	CLEANING WASHER, TUBS

References:

Farm Electrification Comparative Cost Data (cost figures, also figures and references on time saving) Farm Electrification Department, Sears Roebuck and Company, Chicago, Illinois. See page 35 for a list of reference bulletins.
 Putting Electricity to Work on Your Farm (page 5, time-saving figures)
 Westinghouse Electric Corporation, Pittsburgh 30, Pennsylvania, 1945
 Human Energy Cost of Certain Household Tasks, Bulletin No. 282, State College of Washington, Agricultural Experiment Station, Pullman, Washington. 1933

GUIDE FOR FIGURING KILOWATT-HOUR CONSUMPTION PER MONTH

<u>Equipment</u>	<u>KWH</u>	<u>Equipment</u>	<u>KWH</u>
Clock	2	Radio	8
Coffeemaker	5	Range	100
Dishwasher	2½	Refrigerator	30
Fan (household)	2	Roaster	40
Fan (kitchen)	8	Sewing machine	½
Freezer (20 cu. ft.)	125	Toaster	3
Iron	5	Vacuum cleaner	2
Ironer	10	Wafflebaker	2
Lighting	20	Washing machine	3
Mixer	½	Water heater	240

Reference: "Your Electrified Farm," USDA, REA, Washington 25, D. C.

RELATION OF KWH CONSUMPTION TO CO-OP'S RATE STRUCTURE

USE	Aver- age kwh per month	TYPICAL RATE SCHEDULE							
		First 40 kwh \$3.00		Next 40 kwh at 4 cts.		Next 120 kwh at 2 cts.		Over 200 kwh at 1.5 cts.	
		Kwh	Cost	Kwh	Cost	Kwh	Cost	Kwh	Cost
Lights	20	20							
Iron	5	5							
Radio	8	8							
Washing machine	3	3							
Water system	15	4		11	\$0.44				
Brooding--50 chicks	50	40	\$3.00	29	1.16	21	\$0.42		
Refrigerator	30			40	1.60	30	.60		
Range	100					69	1.38	31	\$0.47
						120	\$2.40		
Water heater	240							240	3.60
Milk cooler	30							30	.45
								301	\$4.52

TOTAL MONTHLY COST FOR ALL THESE USES. \$11.52 for 501 kwh
 AVERAGE COST PER KILOWATT-HOUR (KWH), 2.3 cents

RANGE OF WATTAGES OR HORSEPOWER RATINGS OF HOME EQUIPMENT

	Watts		H.P.*
Clothes dryer	1650 - 4500	Clothes dryer	1/20 - 1/4
Coffeemaker	350 - 1000	Dishwasher	1/4
Heater	550 - 9000	Freezer	1/8 - 1/2**
Hotplate	550 - 1650	Ironer	1/30 - 1/6
Heavy-duty	2000 - 4400	Mixer	1/20 - 1/6
Iron	550 - 1250	Refrigerator	1/8 - 1/4
Ironer	1320 - 1650	Sewing machine	1/20
Range	6500 - 15000	portable motor	1/32 - 1/16
Toaster	450 - 1200	Vacuum cleaner	1/6 - 2/3
Wafflebaker	450 - 1000	Washer	1/6 - 1/3***

WATTAGE RANGE GUIDE FOR SATISFACTORY ELECTRICAL HOUSEHOLD EQUIPMENT:

The list below could be used to help in developing house wiring plans, selecting desirable equipment and operating equipment without overloading circuits.

2 - 10	50 - 100	150 - 400	500 - 700
Clock Shaver	Mixer (beater) Fan (portable) Heating pad Lamps Radio Sewing machine	Blanket Freezer Furnace (control and fan) Lamps Mixer Refrigerator Vacuum cleaner Washer	Coffeemaker Dishwasher Freezer Radio combination with television Room cooler
1000	1320 - 1650	1650 - 4500	6600 - 15,000, up
Coffeemaker Heater Hotplate Iron Toaster Wafflebaker	Heater Ironer Roaster	Clothes dryer Heater Hotplate Water heater	Heater Range

* For rough estimating, it may be assumed that motors will deliver about 1 H.P. for each 1,000 watts used.

** Three-fourths H.P. and larger motors occasionally found.

*** Some automatic types demand up to 1½ H.P. at times.

XIII. PLANNING FOR ADDITIONAL TRAINING FOLLOWING THE ORIENTATION PROGRAM

1. Below is a suggested order and combination of subjects for practice shops and to follow the orientation program. The actual order and content of these activities should be determined by the state educational committee and field representative who will assist with carrying on the practice shops. In general the following recommendations should be kept in mind.
 - A. A practice shop should include study of at least one farm and one home application of electricity, and practice in one or more methods of reaching and teaching people.
 - B. At the time of the orientation school electrification advisers might be asked to indicate their preference on practice shops in order of their first, second, and third choice on a prepared list of topics. Or this information might be secured by the committee later in a letter to the manager and electrification adviser.
 - C. Seasonal timing of activities should be kept in mind in setting up practice shops. Training activities should be conducted at least two months ahead of any planned program with members.
2. Suggested Subjects for Training Activities for Electrification Advisers.

<u>Suggested Time</u>	<u>Subject to be Studied</u>	<u>Presentation Method to be Practiced</u>
A. 3 days	Orientation Program	News Releases
B. 5 days	Farmstead Wiring and Safety	Radio Interviews
C. 3 days	Electric Cookery and Poultry Applications	Result Demonstrations
D. 5 days	Running Water and Laundry and Cleaning Equipment	Movies and Lecture Demonstrations
E. 3 days	Dairy Equipment and Refrigeration	Tour of Farm Exhibits Displays
F. 3 days	Small Home Appliances and Feed Grinding	Kitchen Parties Circular Letters
G. 3 days	Special Applications (i.e., Heat Pump, Ensilage Cutting, Hay Drying, etc.)	Posters, Metered Installations
H. 5 days	Irrigation, Garden Watering Hot Beds, etc.	Movies and Audience Testimonials

